WATER MANAGEMENT AND ENVIRONMENTAL CONTROL IN SOUTH FLORIDA

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ABSTRACT

In south Florida, drainage has been the key to use of the land. At the turn of the century a State policy commitment was made to the promotion of land reclamation efforts through drainage. The resultant enormous expansion of agricultural production and urban population has stressed the natural environment. It is now evident that continued expansion can place additional, and perhaps intolerable, strains on the environment. State policies are being re-assessed with emphasis on environmental quality control. In 1972 a body of laws was enacted which may have the effect of controlling environmental quality through the mechanism of water management controls.

INTRODUCTION

The social and economic history of Florida prior to 1880 could have been written about only that part of the State lying north and west of a line drawn between Daytona Beach and Tampa. Such a history would have been very nearly a complete one.

North of that line are the rolling, wooded hills of north and northwest Florida, most of the central lake and ridge country, and the cities of

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Pensacola, Jacksonville and Tampa with their excellent harbors. All of this country has climate and topography similar to that of southern Georgia, Alabama and Mississippi.

South of the line lie the Kissimmee River prairies, the marsh and wet prairies of the upper St. Johns River, the ancient cypress stands of the Big Cypress Swamp, the vast sawgrass marsh of the Everglades and the rocklands of the southeast coast, with Lake Okeechobee at the heart of the region. The incursions into this area were tentative in nature, small in size, and mainly military in character. Here the climate was sub-tropical, the terrain normally impassable for many months of each year, and the natural environment generally inhospitable to Indian and white man alike.

In very few cases, however, is the natural environment so intractable that civilized man, acting in response to social and economic forces, cannot to some degree shape the environment to his perceived needs. South Florida was no exception. As in the western United States, in south Florida water was the key to manipulating the natural environment to meet immediately foreseeable ends; but with a difference. In Florida the problem was seen to be one of too much water in the wrong places at the wrong time, rather than one of too little water in the right places at the right time. It was seen to be a problem of drainage.

GENERAL HISTORY OF DRAINAGE

The simple fact is that in order to make most of south Florida's land usable it must be drained. The process of removing surplus water started at different times at different places throughout the south Florida region.

The first major effort occurred in the 1880's in the lakes area of the upper Kissimmee River Valley. In the 1890's work was started in the

Caloosahatchee River Valley east of Fort Myers and in the lower Kissimmee River. Development along the lower east coast started in the 1900's and in the late 'teens the northern Everglades were opened up. Water control measures in the upper St. Johns River Marsh were started in the 1920's, as well as on the Indian Prairie northwest of Lake Okeechobee. On Lake Okeechobee itself, a scheme for regulating lake levels was brought to completion in the early 1930's. Finally, large-scale drainage and development of the southwest coastal strip, west of the Big Cypress Swamp, was undertaken in the 1950's.

All of this work was done with the blessing and active support of the government of the State of Florida and under the impetus provided by the various State Legislatures and chief executive officers. Land grants were made with the proviso that drainage works be undertaken. Special drainage acts and a general drainage law were passed allowing, and promoting, the establishment of drainage, water control and special improvement districts. Promotion of the agricultural development of south Florida became a major objective of state government in the early years of this century, and an agressive policy commitment to drainage was made in order to achieve that objective.

A brief quotation from the 1927-1928 Biennial Report of the Everglades Drainage District will suffice to illustrate this policy intent:

> "Florida has assumed to a degree the moral responsibility for this undertaking, has encouraged it politically and has fathered it as a great economic development on the theory that it will enhance in value and will reflect to advantage upon the whole State: that it will place upon the tax books property for general taxation which will swell the general revenue of the State, and that it will assist in adding to the State that most valuable

of all possessions - citizens. Furthermore, it may be anticipated as drainage progresses, as colonization, settlement and cultivation of the land advances, as new and important developments expand along divers lines as collateral to the drainage enterprise, that the State will naturally, logically and inevitably become more directly and closely connected with this the greatest work of reclamation and development ever embarked upon by any State in the Union."

The success of that policy, in terms of the desired objective, was rather startling. The 23 counties lying south of the Tampa-Daytona Beach line contain 43% of the area of the State of Florida. Prior to 1900 the amount of land in agricultural production in that region was so small as to represent a negligible portion of Florida's productive agricultural lands. By 1930, the region's share of the State's agricultural lands had increased to 24%, and by 1950, it had reached a figure of 53%.

This enormous expansion of agriculture was accompanied by an equally phenomenal population growth. A factor contributing to this growth was the opening up of rail communications in the interior and along the east coast. But drainage played a key role. In 1900 the population of the southern 23 counties was 71,200, or 13% of the State's total. In 1930 it was 506,500, 35% of the total, and by 1950 these counties contained a population of 1,207,000, or 44% of the total for the State.

The expansion of agriculturally productive lands could, perhaps, have been foreseen by the State's political leadership in 1910. After all, this was the desired goal of a well-defined State policy. But the population

growth created a potential for problems of types which no one in 1910 could have fully realized.

A tragic foretaste of one type of problem came in 1928 with a hurricane over Lake Okeechobee, following a similar occurrence in 1926. An estimated 2000 people who lived along the southwest shore of the Lake were lost in the 1928 storm. The national government now entered the picture and under its inland navigation authority the Corps of Engineers raised levees on the Lake's south rim and improved the discharge outlets from the Lake.

Natural forces in the mid-1940's again pointed out problems created by population growth and the concentration of urban populations. The protracted drought of 1944-45 resulted in massive encroachment of salt water into the aquifer supplying domestic water to lower east coast communities. Then, in 1947, two hurricanes crossed the lower peninsula within the space of a few weeks occasioning an estimated $59 million in damages. Much of this damage occurred in the urban concentrations around Ft. Lauderdale and Miami, on the lower east coast.

Acting now under the broadened authority of the Flood Control Acts of 1935 and 1944, and in response to several Congressional resolutions, the Corps of Engineers developed a comprehensive plan for flood control and allied purposes in late 1947. A major portion of this plan was authorized by the Congress in 1948. The plan covered all, or parts of, seventeen of the 23 south Florida counties. It addressed itself to the twin problems of flood control and water conservation. It had the active support of the State Legislature and the then-Governor. The Central and Southern Florida Flood Control District was established by special act to cooperate with the national government in the implementation and administration of this plan.

Responding a little over a decade later to quite similar natural, social and economic forces, a comprehensive water control plan was prepared by the Corps of Engineers for the area around Tampa. The Four Rivers Basin project for that region was authorized by Congress. It covered all or parts of three of the remaining six south Florida counties, plus several more to the north and east. It, too, had the support of State government, and the Southwest Florida Water Management District was created in 1961 by special legislative act.

All but four of the 23 southern Florida counties are now in whole, or in part, in one or the other of the State's two regional water control districts. Those counties, as of 1970, contained 55% of the total land in agricultural production in the State. They held some 3,787,000 residents, or 55% of the State's population. And they received the bulk of the State's winter tourist impact.

THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT

The seventeen counties of the Flood Control District typify south Florida. They were the recipients of the major thrust of early drainage and land reclamation efforts. They supported the bulk of the population expansion which took place in the 1920's and again in the 1950's and 60's. They experienced from 1926 on, with some frequency, the reactions of the natural environment to the stresses placed on it by agriculture, people and the institutions formulated to foster growth and expansion. And they are neighbors to a vast, and unique, tract of land set aside in 1947 by the Congress for the use of all of the nation; Everglades National Park.

The Central and Southern Florida Project was authorized to address some of the problems which drainage alone had not solved and which it had, in fact,

created. Some of the more obvious problems were flood damage prevention, control of salt water intrusion and prevention of over-drainage. More subtle, but perhaps more important, were the secondary problems related to water supply for the still-expanding agriculture and population. Also recognized was the problem of water supply for Everglades National Park, at the downstream end of a system which extends as far north as the south rim of Lake Okeechobee and, on occasion, beyond that.

But the system of works required to accomplish the flood control objective also has the capability of serving a drainage objective. This objective is designed into the project and benefits are attributed to it. As a result, in accomplishing the major Federal objective of flood control the ninety-year old State of Florida objective of drainage for land reclamation is also accomplished. There is, of course, a substantial difference between earlier drainage plans and the drainage element which is incorporated in the project's comprehensive plan for flood control and water conservation. However, the net effect, in a very simplistic view can be considered to be the same. That is, the basic capability is provided for opening up additional lands for agricultural production and for supporting an expanding population.

There is then, within these 17 south Florida counties, a primary water control plan for flood control, major water supply, water conservation and major drainage. It is about 60% complete overall, but in several important areas it is completely functional. This primary water control system is administered by the District. Water levels and flows are regulated, and permits for surface water discharges and withdrawals are issued. Many supporting activities related to these aspects of water management are performed by the District.

Necessary to the complete functioning of this primary system in terms of flood control and drainage are the secondary and tertiary systems which

connect with that of the District. These systems are provided by several means. The General Drainage Act of 1913, still in effect, permits the establishment of sub-drainage districts by action of the Circuit Court. Special improvement districts can be created by legislative act. Private individuals can excavate canals subject to those regulations, where they exist, imposed by the individual county or municipal governing bodies. None of these sytems require the approval of either the Flood Control District or a central State authority. In this same general area, the establishment of flood criteria, a form of modified flood plain zoning, is entirely the prerogative of local governmental jurisdictions.

From the standpoint of water supply, reasonably effective jurisdiction over surface water supplies has been exercised by the Flood Control District under its permit authority. The majority of the irrigated agricultural acreage within the District receives its water supply from the primary surface water system. A few municipal supplies are in the same situation. However, nearly all the major municipalities, and most of the smaller ones, derive their supplies from groundwater sources. No control over such withdrawals is exercised either by the Flood Control District at the regional level, or by a central State authority.

We see, therefore, that in the functional areas of flood control, drainage and water supply, there are a number of jurisdictions exercising authority and discharging obligations in accordance with specific statutes. When the scope of view is expanded to consider all aspects of water resources management, other entities having fish, wildlife, and water quality responsibilities come into the picture. And always present is the U. S. Department of the Interior and Everglades National Park.

This is only a superficial treatment of the framework within which the Flood Control District has operated for the past 23 years. It does, however, indicate the complexity of the existing institutional arrangements. Many of the District's major objectives have been achieved. It has protected agricultural and urban development from major flooding. It has furnished water for the largest irrigated acreage east of the Mississippi River. It has protected a salt-water contaminated aquifer, and reclaimed portions of it. It has exercised regulatory functions within, and often outside of, the contraints imposed by an ill-defined body of water law. It has played a water management role through sheer cooperative effort with agencies exercising related, but distinct, responsibilities.

But with all this, the stresses on the environment - apparent in the late 1920's and the mid 1940's - are still evident and, perhaps, increasingly so. By some the blame is laid at the feet of the District because its program has promoted and sustained agricultural expansion and population growth. In following a long-established State policy directed toward expanding agriculture and population, the District's program might well be fostering the production of intolerable and environmental stresses. By 1972 the time had arrived for a re-assessment of the old State policy.

Matters of Environmental Concern

There are many matters of environmental concern throughout the nation and this is also the case in south Florida. These matters can be categorized in many ways, the manner chosen being nearly always subjective. I choose to classify them as either substantive matters or matters of largely emotional content. For the purpose of this paper I will focus attention on two substantive matters; the preservation of a healthy aquatic environment in Lake

Okeechobee and the maintenance of a quality environment in the Everglades Basin which includes, but is not limited to, Everglades National Park. These are by no means the only matters of real environmental concern in south Florida, but they are illustrative of what occasioned the need for re-assessment of State policies and objectives.

Lake Okeechobee has a surface area of 750 square miles and, except for points of inflow and outflow, is completely encircled by perimeter levees. The major inflow is the Kissimmee River which drains an area of 2500 square miles. Several smaller natural streams drain to the Lake. Pumped drainage also enters the Lake from agricultural lands around its south half.

An attempt is made to regulate water levels between elevations 14.0 feet and 15.5 feet above mean sea level. Seasonal and cyclical variations in rainfall runoff, however, produce a much wider range of fluctuation in water levels. In more recent years, for example, a maximum level of 17.8 feet occurred in 1960 and a minimum of 10.4 feet in 1971.

Lake Okeechobee is a natural water storage basin; within the normal range of levels each foot of depth contains a volume of 450,000 acre feet. The levees and other works around the Lake will now permit water to be deliberately stored to higher elevations, thus making available for use in south Florida greater amounts of water than hitherto possible.

But there is now concern over the quality of the waters entering the Lake; agricultural runoff from the highly productive lands around the Lake's rim and wastewater from the urban areas in the northern portion of the Kissimmee watershed. Some of these waters have fairly high concentrations of the primary nutrients: nitrogen and phosphorous. It is believed by some ecologists that holding additional quantities of water in the Lake will, first, increase the volumes of nutrients retained in the Lake, and secondly, destroy much of

the emergent vegetation which now acts as a nutrient sink. These processes, in this view, could result in rapid eutrophication of Lake Okeechobee.

In perhaps much too simple terms the question at present appears to be: shall additional water be stored in Lake Okeechobee to meet the requirements of an expanding agriculture and population at the possible risk of damaging a presently healthy, productive and valuable aquatic environment?

The Everglades Basin extends from the south rim of Lake Okeechobee to tidal water at the extreme southwest tip of the peninsula. It is a shallow trough, some 40 miles wide at its widest, located approximately in the middle of the peninsula. The ground slope south and southwestward is almost imperceptible. The surface soils are peat and muck, which are thickest at the south rim of Lake Okeechobee.

The basin can be divided into three segments. The northern section, containing 1100 square miles of the thickest and most productive muck deposits, is the agricultural area; sugar cane, winter vegetables, and beef cattle. This is the area which was opened to farming 60 years ago. It is completely encircled by a system of levees, and primary water control is furnished by a series of major canals and pumping stations; these works all provided by the Central and Southern Florida Project.

The central Everglades and the easterly part of the northern Everglades, containing 1350 square miles, are the so-called water conservation areas of the Project. This part of the basin, too, is encircled by perimeter levees. Here are the typical Everglades; vast sawgrass flats, wet maiden-cane prairies, deeper-water sloughs, and hardwood tree islands. Water levels are regulated by the Flood Control District in a manner such that, as closely as possible, a natural water level regimen and environment is maintained.

The southern Everglades is, essentially, Everglades National Park with about 1200 square miles of land area. Here the fresh water environment of the sawgrass marsh and wet prairies grades into a brackish water ecological system, and finally into the salt water environment of the Everglades estuaries. Historically, about 10% of the water available from direct precipitation and inflow to the Park area during normal years came from the Everglades to the north. This is considered to be a vital volume of water and hence the water in and flowing through the water conservation areas is important to the maintenance of the Park's ecological system.

Most of the water entering the water conservation areas comes from the urban areas to the east and the agricultural areas to the north. Population growth along the east coast demands drainage and water control to make land usable. This, together with the need to supply surface water to the water conservation areas and the Park has resulted in the concept of pumping runoff from the east coast back into the Everglades Basin; the concept of "backpumping."

But here, again, the concern is that these waters of poorer quality will damage the environment of both the Park and the water conservation areas themselves. There is also the secondary concern that, perhaps, this backpumping will result in <u>too much</u> water for both the Park and the conservation areas under certain circumstances; that is, that there may be an adverse effect of a changed water regimen on the natural environment of the 'Glades.

Once more in rather simplistic terms, the question here is: shall more land be prepared for intensive urban development and, if so, shall resultant increased surface runoff be wasted to tidewater or be returned to the Everglades Basin with possible damage to that environment.

These two specific questions, involving two important natural resources of south Florida, give substance to the more generalized notion of "environmental

concern." They place in focus the larger question: how can some balance be achieved between social-economic growth and protection of natural environmental values? The answer which the State of Florida appears to be developing lies along the path of land use control. Past State policy has been reassessed. With the leadership of the Governor and key State legislators, the Legislature this year provided some of the institutional means whereby a degree of environmental control, through land and water use control, can be exercised at a responsible level.

Environmental Quality Control

Five important pieces of legislation in this area were enacted by the 1972 session of the State Legislature. These were the Water Resources Act, the Environmental Land and Water Management Act, the State Comprehensive Planning Act, the Land Conservation Act, and amendments to the General Drainage Act of 1913.

The Water Resources Act is an attempt to establish some basic water law for the State of Florida by declaring all waters within the State subject to regulation for beneficial use. It establishes five regional water management agencies. It provides for the preparation of a State water use plan, and five regional water use plans. It further mandates that these plans be developed in conjunction with State and regional comprehensive land use plans and the State's water quality plan.

The Environmental Land and Water Management Act focuses the attention of the State on those land use decisions having a substantial impact outside the jurisdiction of local governmental units. It defines "areas of critical State concern" and "developments of regional impact." It places these major land use decisions in the hands of the Governor and the elected State Cabinet. An environmental land management study committee is also created.

The State Comprehensive Planning Act designates the Governor as the chief planning officer, with provision for legislative review of land use plans approved by the Governor.

The Land Conservation Act authorizes the issuance of State bonds totalling $240 million; $200 million of which is for the purpose of conserving and protecting environmentally unique and irreplaceable lands. Bond issuance is subject to voter approval at a November 1972 referendum. Under the Environmental Land and Water Management Act no area will be designated as being an area of critcal concern due to its environmental significance until the bond program is approved.

The amendments to the General Drainage Act provide for approval of sub-district "plans of reclamation" by the regional water management agency prior to implementation.

It is much too early to evaluate the effect of this legislative package on environmental control and on the environment itself. Only minor provisions of the Water Resources Act went into effect on July 1 of this year; the bulk of the act becoming effective on July 1, 1973. The General Drainage Act amendments became effective only this month. And the environmental bond program will not be voted on until next month.

The package, however, is evidence of the intent of the State's political leadership to ensure that a greater degree of central, and regional, control over related land and water use decisions is exercised. The net effect may well be the slowing down of essentially unplanned (in terms of regional and State objectives) land developments which place undue stresses on both the water resources and the natural environment.

The objective is clearly the maintenance of a good quality environment. Authorities and responsibilities already being exercised by the State Department of Pollution Control in the area of water pollution are one piece of the

environmental quality control pie. The new land and water use legislation is the other piece. It remains to be seen if the means provided by this legislation is adequate to the objective of environmental quality control.

CONCLUSION

It can readily be seen that one of the major premises of the body of legislation recently enacted in the State of Florida is recognition of the intimate relationship between water management - drainage and water supply - and land use. South Florida's history has established the validity of this premise.

The conclusion, as reflected by this legislation, is logically inescapable. Stresses have been placed on south Florida's environment. These have largely arisen from rapid agricultural and urban expansion; from ever more intensive land use. Continued expansion will lead to further intensive land use, requiring more drainage and increased demands on water supplies. Provision of additional drainage and water supply facilities will add to the stresses on the natural environment. Lake Okeechobee and the Everglades Basin provide possible examples.

Environmental quality control, therefore, can be very nearly equated with land use control; with water use control, in its broadest sense, being one of the mechanisms for exercise of land use control. This basic equation has been well understood for a long time. Also well understood has been the relationship between water control and land use; it was, after all, a keystone of State policy for ninety years. But these relationships have only rarely been used, if at all, to develop a formula for arresting, if not reversing, environmental degradation. In this respect the steps taken by the State of Florida to exercise some firm degree of environmental quality control through land use control are innovative.